

3 a resin which has a refractive index higher than that of said substrate and is filled
4 in said channel for optical waveguide or is disposed on said substrate;

5 wherein the refractive index in a part of said resin varies monotonically in the
6 direction of light propagation and/or in a direction substantially perpendicular to said
7 direction of light propagation.

1 6. (Amended) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and is
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further includes a plurality of temperature
6 controlling elements disposed on said material and for partially changing the
7 temperature of said material in a direction substantially perpendicular to the direction of
8 light propagation.

1 7. (Amended) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and is
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further includes a plurality of electrodes disposed on
6 said material and for partially changing the electric field in said material in the direction
7 of light propagation and/or in a direction substantially perpendicular to said direction of
8 light propagation.

1 8. (Amended) An optical element comprising:

2 a substrate having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and is
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further comprises a part where said material
6 protrudes to the direction of said substrate and/or a part where said substrate protrudes



to the direction of said material, in the direction of light propagation and/or in a direction substantially perpendicular to the direction of light propagation.

1 11. (Amended) A method of fabrication of an optical element comprising the
2 steps of:

3 a) forming photo-hardening resin on a substrate; and
4 b) irradiating light onto said photo-hardening resin, thereby hardening said
5 photo-hardening resin;

6 wherein the amount of said light irradiation in step (b) is varied.

1 12. (Amended) A method of fabrication of an optical element according to
2 Claim 11, wherein the amount of said light irradiation in step (b) is varied substantially
3 periodically or is substantially continuously monotone increasing or decreasing, in a
4 predetermined direction on the surface of said photo-hardening resin.

1 13. (Amended) A method of fabrication of an optical element according to
2 Claim 11 or 12, wherein the intensity of said light irradiation onto said photo-hardening
3 resin in step (b) is varied, whereby the amount of said light irradiation onto the surface
4 of said photo-hardening resin is varied.

1 14. (Amended) A method of fabrication of an optical element according to
2 Claim 13, wherein a mask having partially different light transmissivity is used, whereby
3 the intensity of said light irradiation onto the surface of said photo-hardening resin in
4 step (b) is varied.

1 15. (Amended) A method of fabrication of an optical element according to
2 Claim 11 or 12, wherein a light shielding plate is used so as to sequentially change the
3 region irradiated by said light, whereby the amount of said light irradiation onto said
4 photo-hardening resin in step (b) is varied.

1 16. (Amended) A method of fabrication of an optical element comprising the
2 steps of:

3 a) forming photo-hardening resin on a substrate;
4 b) connecting an optical component to said photo-hardening resin; and

5 c) irradiating light onto said photo-hardening resin, thereby hardening said
6 photo-hardening resin;

7 wherein said optical component is fixed to said photo-hardening resin when said
8 photo-hardening resin is hardened in step (c).

Please add the following claim 19:

1 19. (Newly Added) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and
4 is filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein the refractive index in a part of said material is substantially
6 continuously monotone increasing or decreasing in the direction of light propagation.